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Pilot testing a self-administered dietary assessment website with school-age children and adolescents under laboratory and free-living conditions

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Abstract

Aim: To evaluate the experiences and data of children using the DietAdvice website in a controlled and a free-living environment.

Methods: Observational pilot study under laboratory conditions with face-to-face interviews and a communitybased nutrition and exercise intervention program. The laboratory trial consisted of n = 17 children (aged 9-16 years) and the intervention program consisted of n = 34 adolescents (aged 12-16 years). Thematic analysis of observation/interview notes and $\chi 2$ tests and independent samples t-tests ($P < 0.05$) to compare responses and mean times, respectively, between age groups (group 1 (primary school): 9-12 years; group 2 (secondary school/ adolescent): 13-16 years). Frequency and time of use analyses for the intervention group with comparisons to group 2 of the laboratory observation.

Results: Children had an intermediate (41.2%) or advanced level (58.8%) of computer knowledge and used computers 5.29 ± 2.31 days. There were no significant differences between age groups and time taken to complete website sections, observable behaviours and required assistance. A total of 71% of children found the website easy to complete and understand, yet expressed confusion to complete amount/frequency of food eaten (71%). Adolescents did not appear to be interested in using the website when it was an optional component of their participation. The adolescents in the intervention took one hour and 41 minutes to use the website.

Conclusion: Children and adolescents have the required abilities to use the DietAdvice website; however, improvements to the website to engage their interests may further assist completion.

Keywords

Adolescents, children, dietary assessment, technology

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Pilot testing a self-administered dietary assessment website with school-aged children and adolescents under laboratory and free living conditions

Running title: Dietary assessment with school aged children and adolescents

Original Research

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ABSTRACT

Aim: To evaluate the experiences and data of children using the DietAdvice website in a controlled and a free-living environment.

Methods: Observational pilot study under laboratory conditions with face-to-face interviews and a community based nutrition and exercise intervention program. The laboratory trial consisted of n=17 children (aged 9-16 yrs) and the intervention program consisted of n=34 adolescents aged (12-16 yrs). Thematic analysis of observation/interview notes and chi-square tests and independent samples t-tests ($p<0.05$) to compare responses and mean times respectively between age groups (group one [primary school]: 9-12yrs; group two [secondary school/adolescent]: 13-16yrs). Frequency and time of use analyses for the intervention group with comparisons to group two of the laboratory observation.

Results: Children had an intermediate (41.2%) or advanced level (58.8%) of computer knowledge and used computers 5.29±2.31 days. There were no significant differences between age groups and time taken to complete website sections, observable behaviours and required assistance. 71% of children found the website easy to complete and understand, yet expressed confusion to complete amount/frequency of food eaten (71%). Adolescents did not appear to be interested in using the website when it was an optional component of their participation. The adolescents in the intervention took 1hr 41minutes to use the website.

Conclusion: Children and adolescents have the required abilities to use the DietAdvice website; however, improvements to the website to engage their interests may further assist completion. Research into how these age groups report the foods eaten using an electronic medium is also needed.

Keywords: technology, dietary assessment, children, adolescents

INTRODUCTION

There is growing evidence that poor dietary behaviours developed in childhood and adolescence may impact on the development of future lifestyle-related diseases.[1, 2] The prevalence of overweight and obesity in children aged 7-16years has risen from 11% in 1985[3] to 25% in 2007/08.[4] In order to improve dietary intakes and assess this diet-disease relationship, there is a need for appropriate and accurate methods of assessment to be identified specifically for children.[5, 6]

Diet records and 24 hour recalls remain the most commonly used dietary assessments in studies with children and adolescents,[7, 8] however, both these methods are not appropriate for larger population studies due to subject burden, cost and labour involved.[6, 9] To overcome these issues, many studies have attempted to develop or modify Food Frequency Questionnaires (FFQ) for use amongst children.[10, 11] FFQs also have the potential to improve assessment accuracy due to the increased variability of children's diets.[12] However, FFQs have demonstrated poor agreement amongst children aged four to nine years.[8] This result reinforces the limited cognitive abilities of children to conceptualise time, remember foods and quantify amounts[1, 13, 14] and the issues that need to be considered when administering FFQ's to children.

Overcoming this issue by asking parents to complete dietary assessments has also been problematic, as studies have suggested once children begin attending school or day-care, the accuracy of parental reports decline.[8] However, there is evidence that by the age of eight years the cognitive abilities of children improve and children become very aware of their food intakes.[9] Yet, a lack of motivation and interest to complete dietary assessments is still an issue amongst adolescents.[10] Losing interest, boredom or restlessness during completion of dietary assessments may increase the chance of

errors and misreporting by children who complete self-reports of dietary intakes,[11, 12] however, there is a paucity of literature available from observational studies to support this.

The use of multimedia and computer resources is a new area being explored for engaging children in nutrition education and research.[7, 10] The use of photographic images in self-administered dietary assessments (initially designed for adult populations) has also improved reporting of portion sizes amongst children.[13] Previous nutrition education software programs[14] and a few computerised dietary assessments currently being developed and tested in Europe and the USA[7, 10] have noted anecdotal evidence that children are interested and enthusiastic to complete computer based activities over traditional methods.

The recent development of computer-assisted self-interviewing dietary assessments is increasingly being accepted amongst adult populations.[15, 16] The DietAdvice website is one example of an appropriate self-administered dietary tool that has been successfully used in primary healthcare setting[16] and is presently used in food-based clinical trials. Observational studies of adults interacting with the website have demonstrated the appropriateness of computer software and ease of website use in this population,[15] this type of assessment is yet to be trialled amongst children

The purpose of this pilot study is multifaceted. Firstly, an observational study was conducted to trial the DietAdvice website for its usability under laboratory observation aiming to evaluate the experiences of children/adolescents using the DietAdvice website and their responses towards the program post use. Secondly, having confirmed usability of the website, DietAdvice was trialled in a free-living

community-based nutrition and exercise intervention program to determine the engagement in a different setting.

METHODS

The DietAdvice website. DietAdvice is an automated, self-administered dietary assessment based on the diet history interview and FFQ dietary methodologies. The website follows a multiple pass approach, whereby the questions of one stage must be completed before progressing through to the next stage(s). Demographic and food pattern information (i.e. meals eaten per day and how often per week) is collected first, before the participant reads the available instructions to complete the next three stages of the website. The first stage asks broad food consumption questions within the meals eaten during a 'typical' week; the second stage then asks more specific food questions in relation to the food groups selected in stage one; finally stage three refines these previous selections to include frequency and portion sizes of the foods consumed.

Observational laboratory trial. Children between the ages of nine and 16 years were recruited by convenience sampling through University staff (parents). Children under the age of nine were excluded from this study, as previous research has yielded poor validity and reliability from self-administered dietary assessments in this age group.[17]

Participants were divided into two groups based on their age group one: nine to 12 years (primary school age), and group two: 13 to 16 years (secondary school age/adolescents). As this was a pilot study, conclusions were drawn from a qualitative research perspective regarding the participant's behaviours towards and subjective opinions regarding the website.

Participants were asked to use the DietAdvice website under researcher observation in an observation laboratory. Demographic information such as age, gender, weight and height of each participant was collected prior to website use. Standing height was measured once using a wall-mounted stadiometer (without shoes) and recorded to the nearest 0.1cm. Body weight was measured in an upright position without shoes using scales with a bioelectrical impedance component (Tanita TBF-622) to the nearest 0.1kg. This information was required to complete the demographic page of the website.

Each participant was given a patient identification code to enable login to the website, whilst maintaining confidentiality of their results. Two researchers were present in the observation laboratory to record key observations and offer assistance if necessary. All participants were asked to work individually by following all instructions given by the website and completing all components to the best of their ability. The computer monitor was connected to a projection screen visible to the researchers. The researcher present recorded observations in relation to interaction with the website, issues or difficulties, computer abilities and key observable behaviours. Observable cues were recognised as those that have been associated with boredom or restlessness[11] such as slumped posture, gazing around the room, increased chair movements. “Read instructions slowly” was also identified for each participant if they dragged their cursor over the words whilst reading, paused on diagrams/pictures and did not scroll all the way through the instructions page to skip to the next stage. Children were asked to stop answering questions following completion of the page they were up to after a 45-minute period. This time period was selected based from a previous usability study with older adults.[18] The shortest duration of use for the adults

who were provided with ‘unlimited’ time to use the website was 45 minutes and it was expected that due to the introduction of computers during early schooling, that the children would have the required skills to interact with the computer and Internet.

Upon completion of the website questionnaire, each child completed a face-to-face interview, whereby they were asked questions relating to their experience during the study and potential improvements for the website. Key statements made by the child were documented and children were prompted to elaborate on their responses if they weren’t particularly talkative or gave a vague response. The interview also collected computer use information about the participant, with particular focus on perceived ability to use (how well can they use a computer), access to (number of computers in their household) and frequency of use (days per week and where they are used most).

Nutrition and exercise intervention program. Upon trialling the website under controlled conditions, a trial under free living conditions was attempted. This study was conducted as a pilot study for a larger nutrition and physical activity study: Western Sydney Sporting and Physical Activity (WASPA) Program. The WASPA study addressed the effect of a three month community-based after school program for preventing unhealthy weight gain among overweight and obese adolescents. The DietAdvice website was implemented in this program at baseline.

Ethics approval was granted by the [blinded for review] Human Research Ethics Committee. All interested parents/guardians of the children in this study provided written, informed consent prior to their child’s participation.

Data Analysis. Data from the laboratory trial was transcribed from observation and interview notes for content analysis. NVivo qualitative analysis software (QSR, International Pty. Ltd, Melbourne, Australia, 2000) was used to extract text relevant to each category. Categories were developed throughout the analyses as required. Analysis of the observational notes focused on observable behaviours, difficulties and general abilities of the child during website use. The verbal content of the interviews were then analysed in relation to use of the website and potential improvements from subjective opinions expressed by the participant. Further statistical analyses were also conducted to identify common themes between the two age groups, their frequency of computer use and perceived level of computer abilities. An individual's computer ability level was identified as beginner, intermediate or advanced from the child's own perceptions, in response to "how well do you believe you can use a computer". Participants were also prompted to identify if they could confidently complete specific tasks such as installing computer programs, sending/receiving emails (with attachments), save/access files and downloading information. This allowed the ability level to be categorised based on these perceptions and the assertion they expressed in regards to specific computer tasks. Frequency of computer use was also categorised into two groups for analysis into high (computers used more than four times a week) and low (computers used less than four times a week) frequency.

Initially, the study was designed to observe children and adolescents using the website without assistance from the researcher present. However, during website completion, some continued to raise questions in regard to what they had to do or what they didn't understand. It was then decided that a participant would receive assistance if they expressed they could not continue, after being prompted by the researcher to continue or try and work out the problem. From this, analysis was also conducted on the verbal

content to identify common themes related to difficulties expressed by the participant during website use. The number of issues raised during website completion was identified for each child as how many times they asked for assistance. Participants were then categorised in to two groups for analysis as less than or greater than four issues during completion. Participants were also categorised according to whether they could navigate through the website without assistance (i.e. if they were able to go between stages to amend answers).

Adolescents using the DietAdvice website during the intervention program under free living conditions were not assisted during their use. They were provided with a login code and asked to recall their usual intake. Due to the limited data obtained from this intervention resulting from the optional nature of using the website, only data for time taken to complete the website was analysed.

The DietAdvice website creates log files for each participant to track time taken to complete stages and questions from login to logout. These log files were downloaded for both the observational and intervention pilot trials and total time of use calculated. Times were also calculated for each participant of the observational study in relation to stage completion, observable behaviours, reading instructions/summaries, missing questions and when assistance was required. Analyses were performed using SPSS 15.0 for Windows (Version 15.0.0; 2006, SPSS Inc, Chicago III, USA). Results for continuous demographic variables and times were expressed as means ± SD. Independent samples t-tests were used to assess the differences between time of completion, age groups, computer ability levels and frequency of computer use. Chi-squared analyses were also performed to compare the proportions of responses and

observations again between different age groups, computer ability levels and frequency of use.

RESULTS

Laboratory trial. Demographics and computer use: From the sixteen parents who replied to emails expressing their interest in the study, seventeen children participated in the study. Nine (52.9%) children formed group one (nine to 12y) and the remaining eight (47.1%) were in group two, Table 1. The mean number of computers per household was 2.47±1.51, whilst the mean frequency of computer use was 5.29±2.31 days per week. All participants also reported they had Internet access in their homes. There was a larger though non-significant (p=0.201) proportion of children, group one, (n=5, 55.5%) who reported using computers less than four times a week, in comparison to adolescents, group two, (n=2, 25%). The majority of children in this study (n=10, 58.8%) had an advanced level of perceived computer abilities, and no children were categorised as a beginners.

Children reported using computers the most at home (76.5%), and frequently used them for emails, social networks and games. Group one commonly remarked that “we don’t use them at school that often”, however, the proportions in each age group for where they used computers most were not significantly different (p=0.20). There was a significant difference between age groups and what they reported using computers most frequently for (p=0.006). Group one (n=6, 67%) reported playing games frequently, whereas group two commonly reported using email social networks (n=4, 50%) and for schoolwork (n=4, 50%). None of the children reported schoolwork and no adolescents reported playing games. There was also a significant difference between those who used computers more than four times a week and what they used

them for (p=0.031). A larger proportion of participants who use computers frequently reported using them for emails, social networks and schoolwork.

Table 1: Participant Characteristics for both settings

	Laboratory observation, n (%)	**Intervention program, n (%)**
No. of participants	17	21
Age Group 1	9 (52.9)	-
Male, Female	6, 3	-
Age Group 2	8 (47.1)	21 (95.5)
Male, Female	3, 5	10, 11
Age (yrs, mean±SD)	12.4±1.97	14.4±1.18
Range (yrs, mean±SD)	9 - 16	12-16
No. of Computers per household (mean±SD)	2.47±1.51	-
Frequency of computer use (days per week, mean±SD)	5.29±2.31	-
Computer use		-
Low (<4 days per week)	7 (41.2%)	
High (>4 days per week)	10 (58.8%)	
Where computers are used –		-
Home	13(76.5%)	
School	4 (23.5%)	
What computers are used for-		-
Emails, social networks	7 (41.2%)	
School	4 (23.6%)	
Games	6 (35.3%)	
Perceived ability to use a computer-		-
Beginner	-	
Intermediate	7 (41.2%)	
Advanced	10 (58.8%)	

Website completion: observations and times: During website trial, all participants were able to complete the relevant questions (using the keyboard to enter information), select answers from a list of options using the mouse and logout from the website without any difficulties. During login, however, n=15 (88.2%) participants had difficulties entering the login code (as the login code was case sensitive). Also, during completion of information regarding "frequency of meals per week" (i.e. how many times they eat a specified meal per week), when asked to select the time they typically eat the specified meal from a drop-down list of options, five children (group one n=3; group two n=2) did not select the correct twelve hour time e.g. lunch was answered at 1am and dinner at 6am.

There were no significant differences found between age groups for any of the times recorded, Table 2. All children completed stage one (selection of food groups), whereas only 11 went on to complete stage two (selection of food types) in the time available. Only two children in this study completed all three stages (stage 3 defined the portion size and frequency of consumption) of the website, however, nine children did begin to complete stage three (observations could therefore be recorded with regard to their ability to complete this section i.e. amounts and frequencies of selected foods). The mean time for all participants to complete as much of the website as possible was 47.7±4.71mins.

Of the 14 participants who stopped reading the summaries of their selected foods of each stage at some point during website completion, Table 2, there was no significant difference between age groups. However, participants of group two stopped reading the summaries at 18.3±7.97mins, much earlier than group one at 26.4±11.5mins ($p=0.175$). It was also observed that some participants began to miss questions during

website completion. In this case, they then followed on screen prompts made by the website to go back through food lists on the specified page and complete the forgotten question. 11 children began to miss questions in this study at a mean time of 34.18±9.99mins minutes. There was no difference between time of missing questions and age group.

Table 2: Comparison of observed times between groups of the laboratory conditions

	Age Group 1 (mins, Mean ± SD)	**Age Group 2 (mins, Mean ± SD)**	***p* value**[a]
Stage 1 Completion (n=17)	19.44±8.82	13.75±5.26	0.133
Stage 2 Completion (n=11)	10.80±3.11	15.3±7.37	0.234
Stage 3 Completion (n=2)[b]	-	25.00±4.24	-
Read Instructions	2.44±1.37	2.31±0.92	0.772
Observable Behaviours (n=17)	25.67±8.47	31.25±10.1	0.234
Stopped Reading Summaries (n=14)	26.40±11.50	18.30±7.97	0.175
Missing Questions (n=11)	36.00±5.24	36.17±6.91	0.965

[a] Independent t-test, $p<0.05$

[b] Only n=2 participants from group 2 completed stage three in the time available

The mean time for all participants to read the instructions at the beginning of the website was 2.38±1.14mins, which was not significantly different for age group. However, a significant difference was found between time taken and those who were identified to read instructions slowly (from observation notes). Those who read instructions slowly took 3.15±0.67mins (n=10) whereas those who skim read through the instructions took 1.29±0.64mins (n=7; p=0.00). Although there was no significant difference found between those who did or did not read instructions slowly, a higher proportion of children who read instructions slowly did not require assistance and had less than four issues during website completion. However, a higher proportion of participants who read instructions slowly were not able to navigate without assistance. It was also noted from the observation notes, regardless of reading

instructions slowly, all participants paused momentarily on the pictures and diagrams in the instructions page.

Table 3: Frequency of observable behaviours (focused/interested vs. distracted/uninterested) identified during website completion under laboratory conditions (n= 394)

Behaviours	n(%)
Focused/Interested	
Gaze	59 (14.9%)
Upright Posture	36 (9.1%)
Leaning Forward	20 (5.0%)
Quiet	11 (2.8%)
Increased answering speed	28 (7.1%)
Drags cursor over words (reading)	32 (8.1%)
Scrolls through all options	20 (5.0%)
Distracted/Uninterested	
Confusion (facial)	10 (2.5%)
Frustration	4 (1.0%)
Gaze away from screen	20 (5.0%)
Chair movements	56 (14.2%0
Playing with mouse/keyboard	16 (4.1%)
Restless	26 (6.6%)
Scratches Head	13 (3.3%)
Vocal Sigh/Yawn	30 (7.6%)
Slumped Posture	13 (3.3%)

Observable behaviours were defined as all human-computer interactions dislayed by the participant during their interaction with the website.

There was no significant difference between age group and time of first observable behaviour. In total there were 394 behaviours observed, which included focused/interested behaviours (n=296) and observable behaviours of restlessness or boredom (n=188), table 3. Children were more frequently observed as interested by the website and questions, as they maintained an upright posture, increased speed of answering and gaze was completely focused on the screen. However, increased chair movements were frequently recorded and were the most common observable behaviour of restlessness from the observation notes. Although participants increased their chair movements (i.e. swaying from side to side), they still remained focused on the screen. Some participants did become restless during website

completion by gazing around the room, slumping in posture, vocally sighing between questions and playing with the mouse or keyboard (whilst not answering momentarily). One participant became very frustrated with the program when it would not let them enter a specific stage (as they had missed a question). It was also observed that those who were focused on the website or dragged their cursor over the page whilst reading questions/instructions paused before answering or moving between stages.

Eleven (64.7%) of the participants required assistance during website completion (group one n=5; group two n=6). This result was not significant for age, frequency of use or perceived level of computing ability. However, of the n=7 participants who reported low frequency of computer use (less than four times per week), n=6 required assistance during website completion (p=0.129). Likewise, n=6 of the n=7 children who reported an intermediate level of computing abilities required assistance during website completion (p=0.129). All children demonstrated they were able to change and amend their answers after either reading through the other options or following the realisation they had answered a stage incorrectly.

Common themes were identified from the questions asked and the number of participants who asked them. Nine children asked for assistance in regards to numerical questions, particularly during completion of demographic information and in stage three for frequency and amount of food. The decimal point for example in the default response showed ‘0.0’ for frequency of physical activities per week and the “convert feet/inches to centimetres” button were commonly remarked upon in demographic information, with children regularly asking “what’s that?” Participants

also asked for assistance in stage three to match up the amount of food they would eat in regards to suggested portion sizes selected (i.e. one cup).

Questions were commonly raised early on during completion of the website particularly in regards to the need for caps lock (n=3), the password protection question of “mother’s maiden name?” (n=4), and if an email address was required (n=7). Seven participants expressed difficulty understanding particular foods or words, particularly in regards to ‘supplements’. Many participants paused on the questions asking if they consumed supplements or meal replacements, with some choosing an answer and remarking later on they “need to change it”. It was also mentioned by three of the participants in the interviews post use that they did not know what supplements were or why they answered them.

Six participants (35.3%) required assistance with navigation through the website, particularly after coming to the realisation they had entered a wrong food and needed to return to a previous stage to amend their selection. Assistance with navigation was not significant for age (group one n=3; group two n=3; p=0.858), frequency of computer use (p=0.115) or perceived computing abilities (p=0.585). However, eight of the ten children who reported high frequency of computer use and seven of the ten who had an advanced level of computer abilities were able to navigate without assistance during the study.

It was observed during completion of the first stage for the Breakfast meal that twelve children (70.5%) entered foods that were not relevant for breakfast i.e. rice and vegetables. Three (17.7%) realised their mistake by the following meal (morning tea of stage one, i.e. the next page) and did not require assistance to navigate back

and change their answer. The remaining nine (52.9%) only made the realisation by the second pass of Breakfast, where six participants remarked after a moment of hesitation “I don’t eat that [*specified food*] for breakfast” and required assistance to go back to stage one to amend.

Feedback from Interviews post-website use: Many of the participants reported enjoyment using the website and liked that the layout was easy to follow (n=8, 47%) and it was very detailed (n=7, 41%) and “interesting”. However, they didn’t like the length of the assessment (n=9, 53%).

Completion of the website (n=12, 71%) and following the instructions (n=12, 71%) were reported as the easiest components to understand, whereas completing amounts and frequencies of foods (n=12, 71%) and remembering what they eat over a week (n=10, 59%) was the hardest. Participants suggested the website could be improved if instructions were shorter or spaced out throughout the website to assist with some of the issues they experienced i.e. navigation. Also, increasing the amount of pictures in the website was suggested as an improvement to assist with issues regarding amount and frequency of selected foods. Children commented on some of the portion size options, such as ‘one cup’ or ‘one tablespoon’, as they either made it difficult for children to understand or were considered irrelevant to how they describe how much they eat.

Nutrition and exercise intervention program. Of the 34 participants recruited to the WASPA study, n=2 withdrew from the study, n=10 (31%) did not log-on to the website, n=21 logged in and began the assessment (Table 1) and n=12 (38%) completed the entire DietAdvice assessment taking on average 1:41mins (0:32mins-

2:38mins) to complete. Participants regularly logged in and logged out of the website completing it over a few different days. Those who completed the website within the one sitting took on average 1:11mins to complete (0:32- 2:13mins) while those who logged out and returned later took on average 2:11mins (1:45-2:38mins) to complete. In total only n=3 adolescents took less than one hour to complete the website.

DISCUSSION

This pilot study demonstrated that the school-aged children and adolescents involved were able to use the DietAdvice website regardless of age.

Computerised dietary assessments are a novel approach to assessing the diets of adults, with recent focus being directed towards children.[19] Currently, two computerised 24 hour dietary recalls have been developed and tested - The Young Adolescent's Nutrition Assessment on Computer (YANA-C)[10] and the Food Intake Recording Software System (FIRSST).[20] Although the FIRSST program found 46% match, 24% intrusion and 30% omission rates, and was less accurate than a dietitian assessment, the improved YANA-C found a good level of agreement with other assessment methods (r=0.76) across eight cities in Europe. The underestimation and omission of foods that were common in these studies, however, may also be related to 24 hour dietary recalls.[21] In a study by Baxter,[22] it was observed that children reported less than half of what they eat in a 24-hour recall, in comparison to a 24-hour dietary observation. Therefore, the use of FFQ is potentially beneficial in this population as children have highly variable diets.[21]

The results of our study demonstrate that children and adolescents aged nine to 16 years have competent computer abilities. Previous studies support our results that children who use computers most for schoolwork use them more frequently[23] and

primary school children use computers less than older children, except for games.[24] This study, however, also found those who reported a higher frequency of computer use, used computers the most for emails and social networks, which reflects their increasing popularity. Socio-economic factors have suggested a possible technological division between children, in terms of accessibility and ability to use computers,[24] While it is recognised that the children recruited to the laboratory study were likely to be from a higher socio economic area, the intervention program was conducted in a lower socio-economic area with the majority of participants at least logging in to the website. This suggests that exposure of computers and the Internet through schooling for example may provide the means to allow these children to attain similar computing skills to those of higher socio economic areas.

The website was well received by children in this study who reported it was easy to use, enjoyable and interesting. Previous studies have found children enjoy using computers and being interactive with programs in learning environments, however, they still prefer using computers at home rather than in a school.[25] Although children remained focused on the task given to them, behaviors associated with boredom and restlessness such as a slumped posture, unfocused gaze and increased chair movements[11] were evident during the laboratory website completion. This was also accompanied by not reading summaries of their food selections and involuntarily missing questions, which both began to occur after 30 minutes of completion. This result may be related to the short attention span of some children,[21] or the repetitive nature of the website that may not have been very stimulating given its original development for the adult user.

Maintaining the interest of children during dietary assessments has been studied in previous research.[5, 21] Struempler and Raby[26] developed an interactive nutrition

evaluation program where children played educational games in between answering brief questionnaires related to dietary intake. Another study by Cullen[28] found children reported immediate gratification, challenges and interactive cartoon-like characters as reasons for playing and enjoying computer games. This supports the feedback from this study that the websites layout could be improved with immediate feedback, such as changing the color of words after selection, to assist completion. As children also frequently asked for assistance from the researchers present, immediate feedback following selection of answers and reinforcing the instructions throughout the course of the website may be a potential improvement to maintain interest and offer reassurance during completion.

Issues with the website and asking for assistance were commonly observed when children were required to navigate between stages and when completing numerical questions. This is a common issue when administering assessments to children, as they have limited cognitive abilities involved with memory and recall (both long and short term), particularly younger children.[28] Lack of concentration during assessment can also lead to an increase in errors when self-reporting.[29]

The high proportion of adolescents who did not use the website during the intervention program may relate to the need to complete many other diet and exercise activities during their appointments. Anecdotal feedback from the participants showed that they felt no need to complete more than one diet related activity as they had already completed one earlier. As the participants were not limited to a predetermined time period to complete the website, it was positive to see that more than 50% were still willing to complete the website despite its optional nature within the program.

The results of this pilot study need to be interpreted with caution due to small sample size although the study was a usability study, which traditionally has fewer participants. Also, saturation was achieved very early on; so additional participants would not have been required. This study did not assess the accuracy, validity or reliability of the dietary data obtained from the DietAdvice website amongst children and adolescents as it was beyond the scope of the study.

Children aged nine to 16 years are able to use the DietAdvice website, as they frequently use computers and have the required abilities to use computers in general. If used in the future with children or adolescents, the improvements to the website should be addressed to assist greater completion rates. The use of the website has significant potential to be incorporated into large-scale studies to address issues with time availability, resources and costs. It has the potential to be completed by a large population of children in a short space of time if instructions are provided verbally about the time period of foods to enter. Ideally the website would need to be modified to suit the user needs of this population group and the validity and reliability of the website as a dietary assessment tool in this population requires further study.

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